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## PROCEEDINGS OF SOCIETIES.

ACADEMY OF NATURAL SCIENCES, Philadelphia. — May 9th. Dr. Leidy observed that the so-called phosphate beds of Ashley River, South Carolina, were remarkable for the irregular admixture of multitudes of fossils of different ages, from the early tertiary period inclusive down to the present epoch. The phosphatic nodules, for which the beds are explored, appear to have had their origin from the eocene rocks beneath. These have also contributed numerous remains of marine vertebrates, especially of Zeuglodonts, reptiles and fishes. Mingled in the sand and clay with the phosphatic nodules and bones of eocene animals are innumerable remains of cetaceans, sharks, and other marine animals of perhaps the middle and later tertiary ages. Added to these are multitudes of remains of both marine and terrestrial animals of the quaternary period. Mingled pell-mell are found bones of the eocene Zeuglodonts — animals related to the whales and seals; hosts of teeth of the great eocene shark, *Carcharodon angustidens*; myriads of the teeth of the giant sharks of the later tertiary periods, the *Carcharodon megalodon*; bones and teeth of whales and porpoises; abundance of remains of elephants, mastodons, Megatherium, horse, etc., and occasionally the rude implements of our own immediate ancestors.

From among a collection of fossils from the Ashley phosphate beds, recently submitted to his inspection by Mr. J. M. Gliddon, of the Pacific Guano Company, the specimens were selected which were presented for the examination of the meeting. One of them is a well-preserved tooth of a Megatherium; another, a characteristic portion of the skull of a manatee; a third, a complete tusk of the walrus, indicating a still further point south for the extension of this animal than had been previously known; a fourth, a huge tooth of a cetacean allied to the sperm whale, probably the same as those from the crag of Antwerp, ascribed to *Dinoziphius*. Besides these there are the beaks of three cetaceans of the little known family of the Ziphioids. These are porpoise-like animals, without teeth in the upper jaw, and usually with but a single pair of teeth in the lower jaw. The beaks composed of the coösfified bones of the face are remarkable for their ivory-like density, which probably rendered them available as weapons of defense.

A fourth beak from the same locality, but from another source, belongs to a different species of the same family. These beaks and some associated fossils will form the subject of a paper shortly to be presented to the Academy. The species indicated by the specimens exhibited were described under the names *Choneziphius trachops*, *Choneziphius ciops*, *Eboroziphius celops*, and *Belemnoziphius prorops*.

Professor Leidy, in continuation, remarked that the remains of life, of any kind, were exceedingly rare in the mesozoic red shales which cross our State about fifteen miles north of us. Hence any fossils what

ever from these rocks were of interest. The three cycloid fish scales, and a few detached caudal rays, in the fragments of red shale presented by him this evening, he found on the Perkiomen Railroad, near Yerkes Station, Montgomery County. One of the scales resembles those described by the late Professor E. Emmons, under the name of *Rabdiolepis elegans*, from the mesozoic coal shales of Chatham County, N. C.

Mr. Redfield called the attention of the members to the volume of letters of Zaccheus Collins, belonging to the Academy, which had been recently arranged and bound by him. The volume contains an unbroken series of sixty letters, from Rev. Henry Muhlenberg, of Lancaster, to whom American botany has been so much indebted; also, a correspondence with his son, Fred. Aug. Muhlenberg, in which we find the history of the transfer of the Muhlenberg Herbarium to the American Philosophical Society.

There are also numerous letters from Stephen Elliot, Dr. Jacob Bigelow, Dr. William P. C. Barton, Dr. William Baldwin, Nuttall, Torrey, Leconte, Sr., and many others well known to the scientific world. It cannot be expected that these letters of sixty years ago can add any new botanical facts to our stock, but they have great interest as illustrating the early history of botanical science in our land, and as revealing to us the obstacles which the student of that day encountered in the scarcity of books and in the difficulty of communication.

Professor Frazer spoke of thinness or minuteness of objects under the microscopic and suggested method of studying, by means of the fluorescent ray, objects at present invisible to the highest powers.

Dr. Hunt stated in reply that microscopists were not willing to be limited in their observations by the calculations of mathematicians, and that the comparative darkness of the fluorescent ray would not be favorable to investigations of the kind.

In continuation Dr. Hunt spoke of the destruction of potato-starch by the fungus causing the potato-rot, and stated that he had observed, under the microscope, the absence of starch in the cells attacked by the *Peronospora*, although the fact of such invasion being productive of the result described had been denied.

Mr. Thomas Taylor, of the Department of Agriculture, spoke of the effect of frost upon potatoes, and stated that he had found starch at the end of twelve months in frozen tubers. He also observed that the potato fungus would grow in cells devoid of starch, but he had not observed the destruction of granules by the cause referred to.

May 16th. Mr. Thomas Meehan said that what was popularly known as the "sleep of plants," the closing of some kinds at night-fall, though a matter within common observation, had not, so far as he was aware, been made a subject of physiological investigation, with the view to ascertaining the value, if any, of this kind of motion in the economy of plant life. He had recently discovered that by means of this peculiar

motion the common *Claytonia Virginica* and some buttercups were fertilized by their own pollen. The fertilization of these plants had been somewhat of a mystery to him, as in view of some prevailing theories of cross fertilization by insect agency, these plants ought not to be self-fertilized, but from repeated observations he was satisfied that no insects had visited plants that had yet seeded abundantly. The process of fertilization in *Claytonia* and *Ranunculus*, independent of insect agency, was described minutely.

Plants of course had peculiar functions to perform, and there were pre-ordained plans and special arrangements through which these functions are exercised. But the workings of plant life are so complicated that though we see certain results follow certain movements, we are not always sure that we perceive the great and deeper object arrived at in the order of nature. Hence arose the differences of opinion prevailing in regard to the object of cross fertilization. Some plants had arrangements which seemed to preclude the possibility of self-fertilization, and the assumption followed that nature abhorred close breeding in plants and specially designed such structures to secure the plant against it. He believed that nature had a deeper purpose, as yet unknown, and chiefly because of such instances as he had given this evening, where nature could not abhor close breeding, when the result of the "sleep of plants" was most perfect in securing self-fertilization.

May 23d. Dr. Leidy observed, in continuation of his remarks of the previous meeting, on the extinct animals of the Ashley phosphate beds of South Carolina, that they are remarkable for the multitude of remains of fishes which they contain, especially of sharks and rays. Among the former were the giants of their kind, the *Carcharodon megalodon* and *C. angustidens*. A tooth exhibited of the megalodon shark is five and a half inches long and four and a quarter inches broad at the base. The living white shark, pertaining to the same genus, reaches upward of thirty-five feet in length, and has teeth two inches in length. Supposing the megalodon shark to have reached the same proportions in relation with the size of the fossil teeth, it must have exceeded seventy feet in length, and must have proved the most formidable monster of the ancient ocean.

Another specimen presented for the inspection of the members is a knob of bone, such as is found at the root of the tail of the devil-fish, the largest of the existing rays. In the latter the bone is the only one of the body, and it supports a minute spine, a mere rudiment of the barbed weapon of the sting-ray. Our devil-fish, of which a specimen was once exhibited in Peale's Museum, of this city, reaches a breadth of eighteen feet, with a length of about fifteen feet. The fossil bone, though the only thing left to tell the tale of its former possessor, is quite a characteristic specimen. It is of more robust proportions than that of its living representative, and probably indicates an extinct species, for which the name *Ceratiptera unios* was proposed.

Specimens exhibited of the dental armature of the roof and floor of the mouth of eagle rays were referred to extinct species under the names *Myliobates majester* and *M. mordax*, the former having been one of the largest of its kind. Similar specimens from the eocene marl beds of Monmouth and Burlington counties, N. J., were referred to species with the names of *Myliobates fastigiatus* and *M. jugosus*.

Professor Leidy further directed attention to a specimen of the snout of an extinct cetacean, which he had recently observed among some fossils from the Ashley beds in the Smithsonian collection of the government department of the Centennial Exposition, and which had been obligingly loaned to him for description by Mr. W. P. Blake. The specimen, two and a half feet in length, had the density of ivory, and indicated one of the largest of the little-known family of the ziphioid whales. It was referred to a new genus and species, with the name of *Proroziphius macrops*.

The other fossils are of the giant sloth, the *Megatherium*, presented by Mr. George T. Lewis, of this city. These were also found in the Ashley deposits, and are probably the remains of animals which became mixed in marshes after the elevation of the Ashley deposits above the ocean level.

June 6th. Professor Cope spoke of the structure of the foot in certain eocene unguiculate mammals. The name *Creodonta* was proposed for the group. The peculiarities of eocene forms, allied to the lemurs, were described, and other groups were defined under the names *Mesodonta*, *Insectivora*, *Tillodonta*, and *Tæniodonta*. These were collectively placed under the head of *Bunotheria*.

Mr. Meehan remarked on the subject of cross fertilization of plants and fertilization by insect agency.

June 13th. At the recent meeting of the Academy, Professor Cope called attention to certain fossil remains from the Rocky Mountains. The physical peculiarities of the region in which they were found were described. Among the specimens were fragments of limb bones indicating an animal of considerable size, which was probably allied to *Labyrinthodon* or some other huge batrachian. The name *Dystrophæus viemalæ* was proposed for the form indicated; which is particularly interesting as being the first vertebrate found in the trias of the Rocky Mountains.

June 25th. The members of the Botanical Section reported the holding of a meeting for organization and the election of the following officers:—

Director, Dr. W. S. W. Ruschenberger; vice-director, Thos. Meehan; conservator, C. F. Parker; recorder, Isaac Burk; treasurer, Jose O. Schimmel; secretary, Dr. Leffman.

Dr. Leidy again called attention to the remains of fossil whales from the Ashley River deposits and exhibited another specimen from the Cen-

ennial Exposition, for which the name *Proroziphius conops* was proposed. A fragment of a skull of *Squalodon* from the same collection was also exhibited. The remarkable admixture of fossils of different geological ages in these deposits was again alluded to.

A tooth of a *Megalodon* shark, measuring six and seven tenths inches long, was described, and the opinion advanced that, comparing it with teeth of existing sharks, it probably had belonged to an individual upwards of one hundred feet in length.

Professor Cope recorded having seen remains of a cretaceous vertebrate from the deposit spoken of by Dr. Leidy. It belonged to the sixth genus of the order *Pythonomorpha* and was described under the name of *Cyclotomodon vagrans*.

Professor Cope also exhibited and described a fossil fish from the cretaceous formation of Nebraska. The structure of the mouth was that of the soft-rayed fishes, and the other characters ally it to the group to which belong the mullets. The dentition and the structure of the caudal fin were described and the name *Anogmius aratus* was proposed for the form.

CALIFORNIA ACADEMY OF SCIENCES, San Francisco. — April 3d, Professor Davidson read the first of his series of papers on irrigation, harbors, and engineering in Europe and Asia, giving the results of personal observation. The paper was devoted to Indian irrigation, and was rich in interesting details, and in the value of its conclusions applied to the necessities of artificial water-courses in California. The lecturer said that the Indian canals had not paid private capital, and the expense had been assumed by the government, which is projecting and building a magnificent system of irrigating works.

Dr. Hale, a visitor, related an instance of "mimicry" which he observed in the Santa Cruz Mountains. It was a milk-white spider, in shape, size, and color the exact counterpart of the flower *Medrono*.

April 18th. Captain Bryant, United States Treasury Agent, who is stationed on the Aleutian Fur Seal Islands, was present, and gave a brief history of the habits of the seals and the manner in which they are caught. Notwithstanding the slaughter of one hundred thousand annually by the Alaska Commercial Company, the legal limit under the company's lease from the national government, a careful calculation shows that the seals are increasing, as compared between the year 1869 and the past season, five per cent. in number. The revenue of the government from this source is \$325,000 per annum, being nearly five per cent. on the amount paid for the territory of Alaska.

BOSTON SOCIETY OF NATURAL HISTORY. — June 7th. Communications were read by Dr. W. K. Brooks on The Separation of the Sexes in *Salpa* by means of Natural Selection; by Professor A. Hyatt on Old Age among the *Ammonites* of the *Oölitic Formations*; and by Mr. W. O. Crosby on the Geology of Eastern Massachusetts.

NEW YORK ACADEMY OF SCIENCES.—April 17th. Mr. George F. Kunz read a note on the Phosphorescence of Pectolite, as distinguishing it from the Zeolites. One of the members exhibited a series of Graptolites from the shales of Norman's Kill.

In a paper on the Causes of the Cold of the Ice Period, Dr. Newberry reviewed, from a geologist's standpoint, the theories proposed to account for the cold of the ice period. He said these theories formed two categories: one, the cosmical; the other, the terrestrial.

In the first, the Glacial Period is attributed to astronomical causes, such as variation in the eccentricity of the earth's orbit, in the angle of the axis of the earth with the ecliptic, or in the quantity of heat received from the sun, the passage of the earth through cold spaces in the universe, etc. The discussion of these theories he left to the astronomer and mathematician.

The terrestrial theories considered were those of Lyell and Dana, in which the cold of the Glacial Period is ascribed to a peculiar distribution of land and water, the land being supposed to be high, broad, and continuous in the arctic regions, forming great condensers of atmospheric moisture, and barriers excluding the tropical currents from the arctic sea; and the theory of Professor Henry, which ascribes the great extension of glaciers in the polar regions to a large amount of moisture thrown into the air in the tropics by volcanic agency. Both these theories, however plausible, are based on conjecture only, and are not supported but are opposed by known facts.

For example, in the Tertiary Period the climate over the arctic regions was as mild as that of our Middle and Southern States. A luxuriant forest covered arctic America, — Greenland, Iceland, etc., — in which were the tulip-tree, magnolias, deciduous cypress, and other plants now growing in the United States. At this time the land was broad, for there are almost no marine Tertiary deposits in the arctic regions, and there was land connection between America and Asia, and between America and Europe, forming barriers which must have excluded tropical ocean currents from the polar sea. On the other hand, the land of the tropical regions in Tertiary times was low, for we find marine Tertiaries bordering or covering the continents and islands.

There is no evidence that the arctic lands were high and broad in the Ice Period, but during at least a portion of this period, Greenland, England, and Scandinavia were much lower than now. At the same time the tropical lands were apparently near their present level.

The objections to the volcanic theory are that we have no evidence of unusual volcanic action in the tropics during the Quaternary age, and it is not certain that the production of a great amount of vapor there would produce glaciers in the arctic regions, as, when ascending to the height of a few thousand feet, the vapor would be locally precipitated. The transfer of heat and moisture from the tropics to the poles is chiefly through oceanic and not through atmospheric currents.

For the reasons given, the terrestrial theories were regarded as inadequate, and the conviction was expressed that we must look to some astronomical cause for an explanation of the phenomena of the Ice Period.

May 15th. Mr. I. C. Russell read a paper on the Ancient Glaciers of New Zealand, and Mr. A. A. Julien remarked on the Search for Flint Implements in the Valley of the Saone.

May 29th. The following papers were read: On Determinations of Specific Gravity by the Arabians of the Twelfth Century, by Dr. H. C. Bolton; Notice of Recent Investigations as to a Change of the Earth's Axis at the Close of the Tertiary, by Professor B. N. Martin.

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### SCIENTIFIC SERIALS.<sup>1</sup>

AMERICAN JOURNAL OF SCIENCE AND ARTS. — August. Note on the Development and Homologies of the Anterior Brain-Mass with Sharks and Skates, by B. G. Wilder. The Greenstones of New Hampshire and their Organic Remains, by G. W. Hawes.

THE GEOLOGICAL MAGAZINE. — July. The Carrara Marbles, by G. A. Lebour. Distant Transport of Volcanic Dust, by A. E. Nordenskiöld. On the Mechanics of Glaciers, by D. Burns. Ice and Ice-work in Newfoundland, by J. Milne.

THE GEOGRAPHICAL MAGAZINE. — July. Statistics of Danish Greenland. The Voyage of the Challenger, by J. E. Davis. The Andaman Islands, by F. A. de Röepstorff. A Journey into the Arabian Desert of Egypt, by Drs. Schweinfurth and Güssfeldt. Verrazano, by R. H. Major.

JENAIISCHE ZEITSCHRIFT FÜR NATURWISSENSCHAFT. — April 15th, Ueber Ontogenie und Phylogenie der Insekten, von Paul Mayer.

ANNALS AND MAGAZINE OF NATURAL HISTORY. — July. On the Affinities of the Anthozoa Tabulata, by G. Lindström. *Eozoön Canadense* according to Hahn, by J. W. Dawson.

MONTHLY MICROSCOPICAL JOURNAL. — July. On the Rotifer *Conochilus volvox*, by Henry Davis. On the Abbé Count Castracane's Photographs of Nobert's Nineteenth Band, by H. C. Sorby. On the Aperture of Object Glasses, by F. H. Wenham. On the Limits of the Optical Capacity of the Microscope, by Professor Helmholtz, with a Preface by Dr. H. Tripp.

<sup>1</sup> The articles enumerated under this head will be for the most part selected.